

# PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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## COMPLETE SPECIFICATION.

### Mouth Mirrors.

I, EDUARD ZDARSKY, a German Citizen, of 6 Oberföhringer Strasse, München 8, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a mouth mirror for medical purposes, more especially for dental purposes.

It is known for a mouth mirror to be designed multi-sectionally, so as to enable the vulnerable mirror glass piece thereof to be replaced. For this reason, mouth mirrors are usually equipped with a handle that can be unscrewed from a frame plate carrying the mirror glass piece. Since, however, the frame plate, which is provided with a shank for attachment thereto of the handle, is itself still comparatively expensive and whereas usually only the mirror glass piece is subject to wear and tear, it has already been proposed that the mirror glass piece should be removably fastened in or on the frame plate. In a known embodiment, this is achieved by the use of a magnet which is mounted in the frame plate and which interacts with a magnetisable metal coating layer on the rear face of the mirror glass piece. However, this construction increases the cost of manufacture. In addition, the application of the magnetisable metal coating layer is complicated, and the magnetic attraction is generally not sufficient by itself to retain the glass piece so that the frame plate needs an additional surrounding flange in order to prevent the glass piece from shifting sideways. In turn, the surrounding flange tends to lead to the mirror becoming dirty and to make it difficult to clean. Mirrors designed in such a manner did not appear to gain practical

acceptance and only mouth mirrors of the type having a glass piece rigidly fastened to a frame plate are now available.

It is an object of the invention, therefore, to provide a mouth mirror whose glass piece is readily replaceable, is not susceptible to becoming dirty and can readily be cleaned. With this object in view, the present invention provides a mouth mirror for medical purposes, more especially for dental purposes, comprising a mirror glass piece which is releasably connected to a frame plate having a shank for attachment of a handle thereto, wherein fixedly secured to one face of the glass piece is a metal mounting plate which is connected to the frame plate by means of a coupling such that the glass piece and the mounting plate may be released from the frame plate by rotation of the glass piece and mounting plate relative to the frame plate.

The mouth mirror according to the invention is simple in construction and therefore cheap to manufacture. The glass piece and mounting plate can easily be unscrewed from the frame plate merely by a twist of the fingers, and can readily be exchanged for a new one. When the reflecting surface of the mirror glass piece becomes damaged, only this part, and not the frame plate plus shank, need be discarded.

The invention will be described further, by way of example, with reference to the accompanying drawings in which like reference numerals denote like parts in the various figures and in which:—

Fig. 1 is a sectional view showing a first embodiment of mouth mirror according to the invention;

Fig. 2 is a fragmentary sectional view showing a second embodiment of the mirror, which is similar in construction to the mirror of Fig. 1, but has an intermediate sealing

[Price 4s. 6d.]

layer between its frame plate and its glass piece;

Fig. 3 is a sectional view showing a third embodiment of mouth mirror according to the invention;

Fig. 4 is a sectional view showing a fourth embodiment of mouth mirror according to the invention;

Fig. 5 is a sectional view showing a fifth embodiment of mouth mirror according to the invention, wherein the mounting plate in the form of a diaphragm plate;

Fig. 6 is an underneath plan view showing an alternative form of diaphragm plate which may be used in the embodiment of Fig. 5; and

Fig. 7 is a fragmentary sectional view showing a sixth embodiment of the mirror, this embodiment having a butt edge and incorporating the diaphragm plate illustrated in Fig. 6.

Referring to Fig. 1 of the drawings, a mouth mirror for medical purposes, more especially for dental purposes, comprises a circular mirror glass piece 1, provided with a mirror coating 2, releasably connected to a frame plate 3 which is arcuate in diametric cross-section and is provided with a shank 4. A thread at the free end of this shank 4, intended for attachment of a conventional handle thereto by screwing thereon, is not visible in the drawings. Fixedly secured to the face of the glass piece 1 remote from the coating 2, by means of an adhesive layer 5, is a metal mounting plate in the form of a disc 6 of substantially plano-convex form and of diameter slightly smaller than the glass piece 1, the curvature of the convex side of the disc 6 following that of the concave side of the frame plate 3 so that the thickness of the mounting plate formed by the disc 6 varies in accordance with the curvature of the frame plate 3. Instead of the adhesive layer 5, an ultrasonic weld can be used to joint the glass piece 1 to the disc 6.

A coupling serving to connect the disc 6 to the frame plate 3 is provided by a screw-threaded stud 8 projecting from the frame plate 3 and a matching tapped hole 7 in the disc 6, into which hole 7 the stud 8 threadedly engages.

As already mentioned, the frame plate 3 is arcuate in diametric cross-section. It is formed, at its rim, with a pressing edge 9 for contacting the glass piece 1. This pressing edge 9 is intentionally kept narrow so as to conform readily with the confronting surface of the glass piece and therefore seal tightly therewith.

Shown in Fig. 2 is a mouth mirror which again comprises a glass piece 1 having a mirror coating 2, and a frame plate 3 which is arcuate in diametric cross-section. The glass piece 1 has fixedly secured thereto a

metal mounting plate in the form of a disc 6<sup>1</sup> which, in this embodiment, extends substantially to the edge of the glass piece 1 and is flattened in its rim zone 6<sup>11</sup> to provide a good seat for pressing edge 9<sup>1</sup> of the frame plate 3. As in the case of the mirror shown in Fig. 1, the disc 6<sup>1</sup> is connected to the frame plate 3 by a coupling comprising a central screw-threaded stud 8 on the frame plate 3, and a tapped hole 7 in the disc 6<sup>1</sup>, into which hole 7 the stud 8 engages. For functional efficiency, the disc 6<sup>1</sup> is made of a soft metal, for example copper or brass. The use of such a soft metal assures a really tight seal between the pressing edge 9<sup>1</sup> of the frame plate 3 and the rim zone 6<sup>11</sup> of the disc 6<sup>1</sup>.

In the embodiments shown in Figs. 1 and 2, the frame plate 3 is of relatively large curvature and the disc 6 or 6<sup>1</sup> forming the mounting plate is of appreciable size. This is because the disc 6 or 6<sup>1</sup> is intended, in addition to providing part of the coupling, to serve as a heat reservoir. As is known, prior to being inserted into the oral cavity, a mouth mirror is usually heated by its glass piece being approached to a flame. If this is done with the mirror of Fig. 1 or Fig. 2, the disc 6 or 6<sup>1</sup> is also heated and provides a source from which heat can pass uniformly to the glass piece 1 after the mirror has been withdrawn from the flame. So as largely to eliminate heat conduction to the frame plate 3, the construction of the mirrors of Figs. 1 and 2 is such that an air gap 10 is left for heat insulation between the disc 6 or 6<sup>1</sup> and the frame plate 3.

The mouth mirror shown in Fig. 3 comprises a metal mounting plate in the form of a base plate 26 fixedly secured to the glass piece 1 and the coupling between the base plate 26 and frame plate 23 is provided by a central screw-threaded stud 28 on the base plate 26 and a matching tapped hole 27 in the frame plate 23, the stud 28 engaging into the hole 27. The frame plate 23 has a smaller curvature than the frame plates 3 of the mirrors of Figs. 1 and 2, and around the edge thereof is a comparatively wide pressing edge 29. A sealing ring 30, made of a suitable soft material applied in a suitable manner to the pressing edge 29 of the frame plate 23, is provided to make a good seal.

Fig. 4 shows a further embodiment of the mirror of the invention which comprises a frame plate 33 having a pressing edge 39, glass piece 1 and a metal mounting plate, in the form of a disc 36, fixedly secured to the glass piece 1. In this case, the coupling between the mounting plate and the frame plate 33 is provided by a screw thread 38 on the edge of the disc 36

and a matching screw thread 37 on the internal surface of the rim of the frame plate 33.

5 The mouth mirror shown in Fig. 5 comprises a thin metal mounting plate in the form of a flexible diaphragm plate 41 which is fixedly cemented to the mirror glass piece 1 by means of an adhesive layer 40. The centre of the diaphragm plate 41 carries a screw-threaded stud 48 which engages with 10 a tapped hole 47 formed in frame plate 43 to provide a coupling connecting the diaphragm plate 41 to the frame plate 43. The diaphragm plate 41 covers one entire 15 face of the glass piece 1, but it is not cemented to this entire face, being cemented peripherally to leave a central zone 42, in the region of the stud 48, free of adhesive. The diaphragm plate 41 is also provided 20 with annular ribs 44 which engage in respective corresponding annular grooves 45 formed in the frame plate 43. Because of the peripheral cementing and the presence 25 of the ribs 44, the diaphragm plate 41 is very elastic and flexible, thus assuring a dependable and secure connection between the glass piece 1 and the frame plate 43. By virtue of the flexibility of the diaphragm plate 41, the stud 48 can yield in all directions 30 relative to the glass piece 1 thereby to compensate for irregularities in the glass piece 1 which is not always of an exact shape. The stud 48 can, therefore, readily be aligned with the tapped hole 47 for screwing therein and, because of the shortness of the length of the stud 48, screwing 35 in is possible even in a canted position, for example if the glass piece 1 should not be coaxial with respect to the frame plate 43. The frame plate 43 may form a heat reservoir.

Fig. 6 shows an alternative embodiment of metal mounting plate in the form of a diaphragm plate 41<sup>1</sup> having a screw-threaded stud 48<sup>1</sup>. In this embodiment, the 45 plate 41<sup>1</sup> is formed with an inner rib 44<sup>1</sup> which serves to define the perimeter of the adhesive-free central zone 42<sup>1</sup>. Moreover, this diaphragm plate 41<sup>1</sup> has arcuate slots 50 which are separated by short intermediate webs 51. If a plurality of rings of such arcuate slots 50 is provided, as shown in 50 Fig. 6, the webs, which advantageously are also ribbed, of any one ring are staggered with respect to the webs of the other ring or rings. The diaphragm plate 41<sup>1</sup> designed 55 in this manner can readily adapt itself to changes due to thermal expansion and compensate for the stresses which would otherwise arise between the glass and the metal as a result of temperature variations such as occur during heating or sterilising.

The mirror shown in Fig. 7 is equipped 60 with a metal mounting plate in the form of the diaphragm plate 41<sup>1</sup> of Fig. 6. Unlike

the mirror shown in Fig. 5 which has a flush rim, the frame plate 43<sup>1</sup> in this embodiment extends radially beyond the rim of the glass piece 1 to form a butt edge so that the glass piece 1 is protected. 70

If an especially effective seal is required between the glass piece or the metal mounting plate and the frame plate, a plastics covering may be provided on the pressing edge of the frame plate. This 75 covering can also serve as a heat insulator between these adjacent portions. In each of the described embodiments of the invention, the mounting plate and/or the frame plate may serve as heat reservoir(s). 80

In all embodiments of the invention, of course, the glass piece 1 and its mounting plate can be released from the respective frame plate by rotation of the glass piece 85 and the mounting plate relative to the frame plate.

#### WHAT I CLAIM IS:—

1. A mouth mirror for medical purposes, more especially for dental purposes, comprising a mirror glass piece which is releasably connected to a frame plate having a shank for attachment of a handle thereto, wherein fixedly secured to one 90 face of the glass piece is a metal mounting plate which is connected to the frame plate by means of a coupling such that the glass piece and the mounting plate may be released from the frame plate by rotation of the glass piece and mounting plate relative to the frame plate. 100

2. A mouth mirror as claimed in Claim 1, wherein the mounting plate is in the form of a disc which is secured to the glass piece by an adhesive layer.

3. A mouth mirror as claimed in Claim 105 1 or 2, wherein the frame plate is arcuate in diametric cross-section and is formed, at its rim, with a pressing edge for contacting the glass piece and to seal therewith. 110

4. A mouth mirror as claimed in Claim 1 or 2 wherein the frame plate is arcuate in diametric cross-section and is formed, at its rim, with a pressing edge for contacting a rim zone of the mounting plate 115 and to seal therewith.

5. A mouth mirror as claimed in Claim 3 or 4, wherein the pressing edge is provided with a plastics covering.

6. A mouth mirror as claimed in Claim 120 3 or 4, wherein the thickness of the mounting plate varies in accordance with the curvature of the frame plate.

7. A mouth mirror as claimed in any preceding claim wherein the coupling is 125 provided by a central screw-threaded stud on the frame plate and a matching tapped hole in the mounting plate.

8. A mouth mirror as claimed in any

- of Claims 1 to 6 except 4, wherein the coupling comprises a screw thread provided, on the edge of the mounting plate and a matching screw thread provided on the internal surface of a rim of the frame plate.
- 5 9. A mouth mirror as claimed in Claim 1 or 2, wherein the coupling is provided by a central screw-threaded stud on the mounting plate and a matching tapped hole in the frame plate.
- 10 10. A mouth mirror as claimed in Claim 9, wherein the mounting plate is in the form of a flexible diaphragm plate which is cemented peripherally to the mirror glass piece to leave a central zone free of adhesive.
- 15 11. A mouth mirror as claimed in Claim 10, wherein the diaphragm plate is provided with arcuate slots which are separated by intermediate webs.
- 20 12. A mouth mirror as claimed in Claim 10, wherein the frame plate is provided with annular grooves, the diaphragm plate being provided with corresponding annular ribs.
- 25 13. A mouth mirror as claimed in Claim 11, wherein the frame plate is formed with a butt edge which extends radially beyond the rim of the glass piece.
14. A mouth mirror as claimed in any of Claims 1 to 8, wherein an air gap separates the mounting plate from the frame plate.
15. A mouth mirror as claimed in any preceding claim wherein the mounting plate and/or the frame plate serve as heat reservoir(s).
16. A mouth mirror substantially as hereinbefore described with reference to and as illustrated in Fig. 1, Fig. 2, Fig. 3, Fig. 4, Fig. 5 or Fig. 7 of the accompanying drawings.
17. A mouth mirror substantially as hereinbefore described with reference to and as illustrated in Fig. 5 of the accompanying drawings, when modified in accordance with Fig. 6 of the said drawings.

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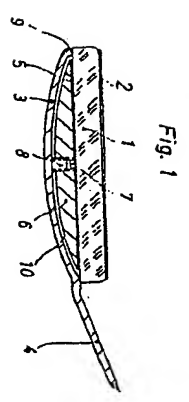


Fig. 1

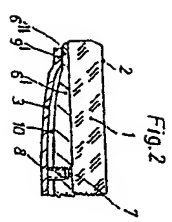


Fig. 2

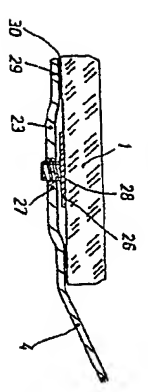


Fig. 3

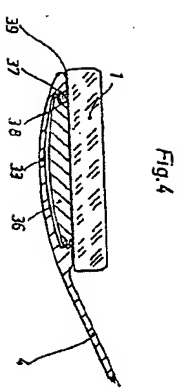


Fig. 4

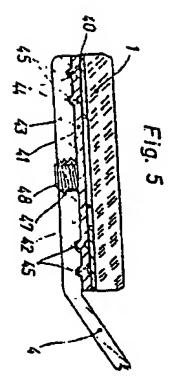


Fig. 5

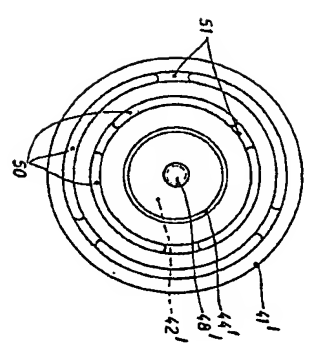


Fig. 6

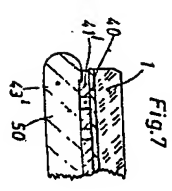


Fig. 7

